

WHAT IS CLAIMED IS:

1. A temperature history displaying medium comprising
a color forming component which comprises an ^(A)electron
donating dye and an electron ^(B)accepting compound and which
5 achieves a colored state by a reaction of the electron
donating dye and the electron accepting compound, and a
color erasing component comprising a color ^(C)erasing agent
having a function to discolor the color forming component
in the colored state, wherein the discoloring is triggered
10 upon application of at least one of dotted heat and
patterned heat, and wherein a temperature history is
determined depending on the discoloring state of the color
forming component in the colored state.

15 2. The temperature history displaying medium
according to Claim 1, wherein the color erasing component
further comprises a supercooling material having a
supercooling property such that when the color erasing
component is heated at a temperature not lower than a
20 melting point of the color erasing component so as to
achieve a liquid state and then cooled, the color erasing
component keeps a supercooling liquid state at a
temperature between the melting point and a glass
transition temperature of the color erasing component, and
25 keeps a frozen state at a temperature not higher than the
glass transition temperature, wherein the color erasing
component in the supercooling liquid state repeatedly

achieves the frozen state and returns to the supercooling liquid state when the color erasing component in the supercooling liquid state is cooled and heated.

5 3. The temperature history displaying medium according to Claim 2, wherein the color erasing agent serves as the supercooling material.

10 4. The temperature history displaying medium according to Claim 1, wherein the temperature history displaying medium further comprises a substrate, a color forming layer which comprises the color forming component, and a color erasing layer which comprises the color erasing component, and wherein the color forming layer and the
15 color erasing layer are overlaid on one side of the substrate.

20 5. The temperature history displaying medium according to Claim 4, wherein the temperature history displaying medium further comprises a barrier layer which is formed between the color forming layer and the color erasing layer.

25 6. The temperature history displaying medium according to Claim 4, wherein the temperature history displaying medium further comprises a protective layer which is formed on the side of the substrate on which the

color forming layer and the color rasing layer are formed.

7. The temperature history displaying medium according to Claim 4, wherein the temperature history displaying medium further comprises an undercoat layer which is formed on the side of the substrate on which the color forming layer and the color erasing layer are formed and which is closer to the substrate than the color forming layer and the color erasing layer.

8. The temperature history displaying medium according to Claim 7, wherein the undercoat layer comprises micro hollow particles having a hollow rate not less than about 30 %.

9. The temperature history displaying medium according to Claim 4, wherein the temperature history displaying medium further comprises an adhesive layer which is formed on a side of the substrate which is opposite to the side on which the color forming layer and the color erasing layer are formed.

10. The temperature history displaying medium according to Claim 9, wherein the temperature history displaying medium further comprises a backcoat layer which is formed b tween the adhesive layer and the substrate.

11. The temperature history displaying medium according to Claim 1, wherein the temperature history displaying medium comprises a substrate, and a coloring/discoloring layer which is formed overlying the substrate and which comprises the color forming component and the color erasing component, and wherein the color erasing component is microencapsulated.

12. The temperature history displaying medium according to Claim 1, wherein the temperature history displaying medium comprises a substrate, and a coloring/discoloring layer which is formed overlying the substrate and which comprises the color forming component and the color erasing component, and wherein at least one of the electron donating dye and the electron accepting compound is microencapsulated.

13. The temperature history displaying medium according to Claim 1, wherein the color forming component comprises a plurality of electron donating dyes.

14. The temperature history displaying medium according to Claim 1, wherein the temperature history displaying medium further comprises a color pigment.

15. The temperature history displaying medium according to Claim 1, wherein the color erasing component

comprises a plasticizer which is solid at room temperature.

16. The temperature history displaying medium according to Claim 15, wherein the plasticizer has a melting point of from about 40 to about 150 °C.

17. A temperature history displaying method comprising the steps of:

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10 providing a temperature history displaying medium comprising a color forming component which comprises an electron donating dye and an electron accepting compound and which achieves a colored state by a reaction of the electron donating dye and the electron accepting compound, and a color erasing component which comprises a color erasing agent, wherein the color erasing agent has a function to discolor the color forming component in the colored state;

15 applying at least one of dotted heat and patterned heat to the temperature history displaying medium to form a colored image in the temperature history displaying medium and to imagewise heat the color erasing agent;

20 allowing the temperature history displaying medium having the colored image to set together with a good whose temperature history is to be determined; and

25 determining the temperature history of the good by a change of the image.

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18. The temperature history displaying method according to Claim 17, wherein the heat applying step is performed with a thermal printhead.

5 19. The temperature history displaying method according to Claim 17, wherein the change of the image is an erasing degree of the image.

10 20. The temperature history displaying method according to Claim 17, wherein the change of the image is a change of color tone of the image.

21. The temperature history displaying method according to Claim 17, wherein the temperature history
15 displaying medium has sides and includes a color forming layer which comprises the color forming component and a color erasing layer which comprises the color erasing component, both layers being formed on the same side of the temperature history displaying medium, wherein the method
20 further comprises an image information recording step of recording image information overlying the side of the temperature history displaying medium on which the color forming layer and the color erasing layer are formed, wherein the image information substantially disappears when
25 the colored image is formed, and wherein the temperature history of the good is determined by the ability of the image information to be visually observed as a result of

the discoloring of th colored image.

22. The temperature history displaying method according to Claim 17, wherein the change of the image is
5 optically detected with a scanner.

23. A temperature history displaying method comprising the steps of:

providing a temperature history displaying medium
10 comprising a color forming component which comprises an electron donating dye and an electron accepting compound and which preliminarily achieves a colored state by a reaction of the electron donating dye and the electron accepting compound, and a color erasing component which
15 comprises a color erasing agent, wherein the color erasing agent has a function to discolor the color forming component in the colored state when the color erasing component is heated;

applying at least one of dotted heat and patterned
20 heat to the colored temperature history displaying medium to imagewise heat the color erasing component;

allowing the temperature history displaying medium to set together with a good whose temperature history is to be determined; and

25 determining a temperature history of the good by a change of th imagewise h ated portion of the temp rature history displaying medium.

24. The temperature history displaying method according to Claim 23, wherein the heat applying step is performed with a thermal printhead.

25. The temperature history displaying method according to Claim 23, wherein the change of the image is an erasing degree of the imagewise heated portion of the temperature history displaying medium.

26. The temperature history displaying method according to Claim 23, wherein the change of the image is a change of color tone of the imagewise heated portion of the temperature history displaying medium.

27. The temperature history displaying method according to Claim 23, wherein the temperature history displaying medium includes a substrate, a color forming layer which comprises the color forming component and a color erasing layer which comprises the color erasing component, wherein at least one of the substrate, the color forming layer and the color erasing layer is colored a color different from the color of the colored color forming component, and wherein the temperature history of the good is determined by an image visually observed as a result of the discoloring of the colored color forming component.

28. The temperature history displaying method according to Claim 23, wherein the change of the image is optically determined with a scanner.

5 29. A method for manufacturing a temperature history displaying medium comprising the steps of:

forming a color forming layer overlying one side of a substrate, said color forming layer comprising a color forming component which comprises an electron donating dye and an electron accepting compound and which achieves a colored state by a reaction of the electron donating dye and the electron accepting compound;

10 forming a color erasing layer, which comprises a color erasing component which comprises a color erasing agent, overlying the color forming layer; and

15 optionally forming a protective layer overlying the color erasing layer, wherein the color erasing agent has a function to discolor the color forming component in the colored state, wherein the discoloring is triggered upon application of at least one of dotted heat and patterned heat, and wherein a temperature history is determined depending on the discoloring state of the color forming component in the colored state.

25 30. The method according to Claim 29, wherein the method further comprises a coloring step of;

allowing the color forming layer to achieve a colored state before the color erasing layer forming step.

31. The method according to Claim 30, wherein the coloring step is performed by heating the color forming layer.

32. The method according to Claim 30, wherein the coloring step is performed by coating an organic solvent on the color forming layer.

33. A method for manufacturing a temperature history displaying medium comprising the steps of:

forming a color erasing layer, which comprises a color erasing component which comprises a color erasing agent, overlying one side of a substrate;

forming a color forming layer overlying the color erasing layer, said color forming layer comprising a color forming component which comprises an electron donating dye and an electron accepting compound and which achieves a colored state by a reaction of the electron donating dye and the electron accepting compound; and

optionally forming a protective layer overlying the color forming layer, wherein the color erasing agent has a function to discolor the color forming component in the colored state, wherein the discoloring is triggered upon application of at least

one of dotted heat and patterned heat, and wherein a temperature history is determined depending on the discoloring state of the color forming component in the colored state.

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34. A method for manufacturing a temperature history displaying medium comprising the steps of:

forming, in overlying relation to one side of a substrate, a coloring/discoloring layer which comprises a color forming component and a color erasing component which is microencapsulated, said color forming component comprising an electron donating dye and an electron accepting compound and which achieves a colored state by a reaction of the electron donating dye and the electron accepting compound, and said color erasing component comprising a color erasing agent having a function to discolor the color forming component in the colored state; and

optionally forming a protective layer overlying the coloring/discoloring layer, wherein the discoloring is triggered upon application of at least one of dotted heat and patterned heat, and wherein a temperature history is determined depending on the discoloring state of the color forming component in the colored state.

35. The method according to Claim 29, further

including at least one of the following steps:

(a) forming an undercoat layer on said one side of the substrate and forming the color forming layer overlying the undercoat layer;

5 (b) forming a barrier layer overlying the color forming layer and forming the color erasing layer overlying the barrier layer.

10 36. The method according to Claim 33, further including at least one of the following steps:

(a) forming an undercoat layer on said one side of the substrate and forming the color erasing layer overlying the undercoat layer;

15 (b) forming a barrier layer overlying the color erasing layer and forming the color forming layer overlying the barrier layer.

20 37. The method according to Claim 34, further including the step of forming an undercoat layer on said one side of the substrate and forming the coloring/discoloring layer overlying the undercoat layer.